

LLNL Environmental Restoration Division (ERD)
Standard Operating Procedure (SOP)

ERD SOP 2.5: Surface Water Sampling—Revision: 2



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1.0 PURPOSE

The purpose of this SOP is to establish surface water collection techniques that ensure collection of representative samples.

2.0 APPLICABILITY

This procedure is applicable to the sampling of surface water at Site 300 and the Livermore Site. Surface water may include rainwater runoff, springs, and building discharges. Building discharges may include cooling tower discharges and/or effluent from septic systems.

3.0 REFERENCES

- 3.1 deVera, E. R., B. P. Simmons, N. D. Stephen, and D. L. Storm (n.d.), *Samplers and Sampling Procedures for Hazardous Waste Streams*, U.S. EPA, Washington, D.C. (EPA-600/2-80-018).
- 3.2 Ford, P. J., P. J. Tarina, and D. E. Seely (1984), *Characterization of Hazardous Waste Sites—A Methods Manual*, 302. Vol. II of *Available Sampling Methods*, Second Edition, U.S. EPA, Washington, D.C. (EPA/600/4-84/076).
- 3.3 Instrument Specialties Company (1980), *Instruction Manual, Model 2100 Wastewater Sampler*.

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- 3.4 Korte, D.N., and D. H.aley (1983), *Procedures for Field Chemical Analyses of Water Samples*, U.S. Department of Energy, GJ/TMC-07, Technical Measurements Center, Grand Junction Project Office, Grand Junction, Colo.
- 3.5 Korte, D.N., and P. H.earl (1985), *Procedures for the Collection and Preservation of Groundwater and Surface Water Samples and for the Installation of Monitoring Wells*, Second Edition, U.S. Department of Energy, GJ/TMC-08, Technical Measurements Center, Grand Junction Projects Office, Grand Junction, Colo.
- 3.6 U.S. Department of the Interior publication (n.d.), *National Handbook of Recommended Methods for Water-Data Acquisition*, Washington, D.C.
- 3.7 U.S. EPA (1982), *Handbook for Sampling and Sample Preservation of Water and Wastewater*, Washington D.C. (EPA-600/4-82-029).
- 3.8 U.S. EPA (1983), *Methods for Chemical Analysis of Water and Wastes*, Washington, D.C. (EPA-600/4-79-020).
- 3.9 U.S. EPA (1984), *Test Methods for Evaluation of Solid Waste*, Second Edition, Washington, D.C. (EPA-SW-846).

4.0 DEFINITIONS

See SOP Glossary.

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

The field personnel's responsibility is to properly perform Surface Water Sampling in compliance with all applicable regulations and procedures to ensure the samples and data provided are representative of actual conditions.

5.3 Sampling Coordinator (SC)

The SC's responsibilities are to ensure that the field personnel have been properly trained, they comply with all applicable regulations and procedures, and generate all applicable field sheets.

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5.4 Subproject Leader (SL)

The frequency of surface water sample collection is determined by the SL in coordination with the SC.

6.0 PROCEDURES

6.1 Preparation

- 6.1.1 Prior to commencement of field activities, perform preparation activities described in SOP 4.1, “General Instructions for Field Personnel.” Personnel shall meet all training requirements, review the appropriate Site Safety Plan (SSP), and all applicable SOPs, Operational Safety Procedures (OSPs), and Integration Work Sheets (IWSs) prior to performing work. Current copies of all relevant documents shall be retained by the field personnel.
- 6.1.2 Review all pertinent sampling information, such as the quarterly Sampling Plan, Well Specification Table, Technical Information Spreadsheet, and electronically generated Ground Water Sampling Data Sheets (if applicable) provided by the SC. The plan contains the following information:
 - Locations to be sampled.
 - Proposed sampling methods (See SOP 1, “Pre-sample Purging of Wells,” Attachment B, Methodology Sampling Codes).
 - Requested analyses.
 - Contract analytical laboratory (CAL) to which samples are to be sent for analyses.
 - Estimated amount of purge water to be collected.
 - Current technical information for each well.
- 6.1.3 Obtain appropriate data collection forms i.e., Chain-of-Custody (CoC) forms, Ground Water Sampling Data Sheets (SOP 2.1, Attachment C), assigned Document Control Logbook, labels, and any necessary shipping forms. Instructions for completing the logbook entries and field forms are provided in SOP 4.2, “Sample Control and Documentation. Consult with the SC for the appropriate pre-sample purging method to apply to the site if it is not indicated on the sampling plan.
- 6.1.4 Compile all necessary equipment and instrumentation for sampling according to Attachment D, Equipment Checklist in SOP 2.1.
- 6.1.5 The appropriate number and type of sample containers needed for the sampling event should be obtained from the sample bottle inventory. The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirement. See SOP 4.3, “Sample Containers and Preservation.”
- 6.1.6 The appropriate personnel should keep a sufficient stock of sample containers and maintain an inventory of supplies (i.e., disposable 0.45µ fiber filters, trip blanks, field blank water (ordered from the contract analytical laboratory (CAL), plastic bags, etc.), to ensure adequate sampling supplies are available at all times.
- 6.1.7 The Livermore Site SC or appropriate personnel coordinates the samples and analytical labs as planned. The Site 300 field personnel notifies the SC when collecting samples with short holding times (e.g., hexavalent chromium, fecal and

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total coliform). When samples are collected, the SC or appropriate personnel informs the CAL ahead of time to allow for preparation.

- 6.1.8 The Administrative Escort Services must be given a 24-hour notice before work is scheduled in restricted areas. If appropriate, arrange access to sampling areas through the Facility Point of Contact (FPOC) or the control point Operator per SOP 4.1, "General Instructions for Field Personnel."
- 6.1.9 Routine maintenance of ground water monitor wells and equipment such as generators and well-wizard controllers should be performed on a quarterly basis, when possible as deemed by SOP 2.12, "Ground Water Monitor Well and Equipment Maintenance." Prior to usage in the field, assigned sampling personnel should check equipment for cleanliness, proper operation, and ensure that the batteries are charged and the fittings are secure. Use gloves when handling compressors and generators, and dispose of them immediately to avoid possible sample contamination.
- 6.1.10 Fill out initial information on the Ground Water Sampling Data Sheet and Document Control Logbook per instructions in SOP 4.2.
- 6.1.11 Organize sampling route.

A. Site 300

- 1. Complete an entire study area before beginning the next, when possible.
- 2. Sample wells working from the least contaminated to the most contaminated, when possible.

B. Livermore Site

The Livermore Site SC may specify the order of well sampling. The Livermore Site contains overlapping study areas which are not hydrogeologically isolated. When working with portable equipment, sample wells from least to greatest contaminant levels, as directed by the SC.

6.2 Field Preparation

- 6.2.1 Assemble all appropriate sampling equipment (Attachment A) and load into field vehicle. Make sure that all sampling equipment is decontaminated according to SOP 4.5, "General Equipment Decontamination."
- 6.2.2 Locate surface waters to be sampled and determine the best sampling order. Always sample from least contaminated area to most contaminated area, if possible. Ensure that permission for offroad travel has been granted, if applicable, as described in SOP 4.1, "General Instruction for Field Personnel".
- 6.2.3 Fill out any initial information in the Document Control Logbook (SOP 4.2).

6.3 Operation

6.3.1 Sampling Location

Pick a sample location as close to the source as possible. In the case of building discharges (e.g., if the water is coming from a pipe or culvert), the samples should be collected directly from the pipe to reduce volatilization. In some cases (springs and some discharge locations), samples have to be collected directly from ground depressions.

6.3.2 Low Water-Yielding Springs

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- A. Manually dig a small depression in the saturated soil with a clean trowel or shovel.
- B. Collect samples to be analyzed for VOCs as soon as sufficient water has filled the depression. Collect samples to be analyzed for other compounds as soon as sufficient water has filled the depression to fill remaining containers.
- C. Continue sample collection by following steps in Section 6.3.3 A through E.

6.3.3 High Water-Yielding Springs

If plenty of water is available, the procedures are as follows:

- A. Collect samples in order of volatility, with samples to be analyzed for VOCs first. For small surface water bodies, collect samples directly into the container that will be sent to the laboratory. There can be no head space within the container (SOP 2.6, "Sampling for Volatile Organic Compounds").
- B. Collect samples for other analyses directly into their appropriate container, or samples can be collected using a portable electric pump. The use of a clean glass, stainless steel or Teflon vessel can also be utilized to transfer water into a specific sample container. Such "dip buckets" should be used to collect samples from large surface water bodies to allow collection from near the center of the water body. A collection vessel should also be used if the sample container already contains any necessary preservative.
- C. Secure caps tightly and attach an identification label to all containers. Instructions for filling out the identification label are in SOP 4.2. Fill in all Ground Water Sampling Data Sheets and Document Control Logbook and any additional information, as required.
- D. Place samples into chilled cooler to maintain samples at 4°C (SOP 4.4).

6.4 Post Operation

- 6.4.1 Before leaving the sampling location, verify that the appropriate samples have been collected according to the samples scheduled on the Ground Water Sampling Data Sheets.
- 6.4.2 Prior to sampling another site and to prevent cross contamination of equipment between locations, thoroughly decontaminate all equipment that is not dedicated according to SOP 4.5, "General Equipment Decontamination."
- 6.4.3 Complete the appropriate Ground Water Sampling Data Sheet and record sampling information in the assigned Document Control Logbook (SOPs 2.1 and 4.2).
- 6.4.4 Verify that the CoC is appropriately completed per SOP 4.2. Indicate any special instructions in the Remarks Section of the CoC. Such instructions may include a request for the laboratory to filter and preserve the sample upon receipt. Also, for wells that are listed on the sampling plan as Clean Wells or for any well that is expected to be free of contamination write, "Verify any positive detections and call _____." The blank should be filled in with the appropriate QC Chemist's name and phone number.

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- 6.4.5 For newly discovered locations, mark the sampling location and ID on a copy of a site map. Mark the field location with fluorescent marker tape adjacent to where the samples were collected. This reference point should be subsequently surveyed.

6.5 Post Operation

- 6.5.1 Perform post operation activities per SOP 4.1.
- 6.5.2 Inventory sampling equipment and supplies. Repair or replace all broken or damaged equipment.
- 6.5.3 Replace expendable items.
- 6.5.4 Deliver Ground Water Sampling Data Sheets and CoC forms to the SC daily. Hand carry or mail copies of the completed CoCs to the Technical Release Representative (TRR) daily.
- 6.5.5 The SC will retain a copy of the original forms (CoC, Ground Water Sampling Data Sheets), and provide the originals to the Data Management Team (DMT) for final archive. The SC will provide copies of the forms to the appropriate Operations and Regulatory Affairs Division Analyst, as necessary.
- 6.5.6 Leave routine samples and proper documentation in the environmental sample lock-box for the CAL. Field personnel will ship samples and/or distribute to the appropriate laboratories. Ensure that the samples requiring refrigeration remain at $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$, but do not allow them to freeze. Always ensure that proper chain of custody is maintained.

7.0 QA RECORDS

- 7.1 Ground Water Sampling Data Sheets
- 7.2 Document Control Logbooks
- 7.3 Chain-of-Custody Forms

8.0 ATTACHMENTS

Attachment A—Equipment Checklist

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Attachment A

Equipment Checklist

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Equipment Checklist

- _____ Air tight plastic bags
- _____ Alconox (detergent)
- _____ Appropriate SOPs, Site 300's Site Safety Plans, Livermore's Site Safety Plans, Sampling Plans, OSPs, etc.
- _____ Brushes
- _____ Deionized water
- _____ Disposable towels
- _____ Fluorescent marker tape
- _____ Glass beaker (if necessary)
- _____ Gloves
- _____ Ice chest with bagged ice or Blue Ice
- _____ Logbook
- _____ Maps
- _____ Packing material
- _____ Paper towels
- _____ Permanent ink markers
- _____ Portable electric pump and disposable tubing
- _____ Sample containers and appropriate preservative when necessary
- _____ Shovel
- _____ Trash bags
- _____ Trowel